भारतीय मानक
Indian Standard

IS 3883 : 2019

टमाटर प्यूरी — विशिष्टि

(दूसरा पुनरीक्षण)

Tomato Puree — Specification

(Second Revision)

ICS 67.080.01

भारतीय मानक ब्यूरो
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FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Fruits, Vegetables and Allied Products Sectional Committee had been approved by the Food and Agriculture Division Council.

The Fruits, Vegetables and Allied Products Sectional Committee has been published two standards for tomato concentrates, namely, IS 3883 'Tomato puree — Specification' and IS 3884 'Tomato paste — Specification'.

This standard was first published in 1966 to develop a stable market of canned tomato products in the country as well as overseas and subsequently revised in 1993 taking into consideration the Codex Standard for processed tomato concentrates (CODEX STAN-57-1981).

During the first revision, EEC Regulation No. 1764/86 on minimum quality requirements for tomato based products eligible for production aid has also been considered and the requirements of this standard were aligned to the EEC Regulation to facilitate trade in EEC countries. Additional requirements for EEC were also incorporated in the standard. The first revision was amended in April 1996 to introduce scheme for labelling environment friendly products to be known as ECO-Mark at the instance of the Ministry of Environment and Forests (MoEF).

This second revision of this standard is being carried out to harmonize the standard with *Food Safety and Standards Act*, 2006 and Regulations framed thereunder. In this revision the following major changes have been made:

a) Use of food additives as per *Food Safety and Standards* (*Food Product Standards and Food Additives*) *Regulations*, 2011 has been permitted;

b) The limits of heavy metal contaminants has been modified as per *Food Safety and Standards* (*Contaminants, Toxins and Residues*) *Regulations*, 2011;

c) Additional HPLC method has been prescribed for testing of benzoic acid; and

d) The microbiological requirements has been modified as per *Food Safety and Standards* (*Contaminants, Toxins and Residues*) *Regulations*, 2011.

In the formulation of this standard, due consideration has been given to the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations*, 2011 and *Legal Metrology (Packaged Commodities) Rules*, 2011. However, this standard is subject to restrictions imposed under these rules, wherever applicable.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TOMATO PUREE — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for tomato puree.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

IS No./Other Publication	*Title*
2860 : 1964	Methods of sampling and test for processed fruits and vegetables
ISO 5522 : 1981	Fruits, vegetables and derived products — Determination of total sulphur dioxide content
5781 : 1993	Fruit and vegetable products — Determination of dry matter content by drying under reduced pressure and of water content by azeotropic distillation (*first revision*)
5887 (Part 3) : 1999	Methods for detection of bacteria responsible for food poisoning: Part 3 General guidance on methods for the detection of *Salmonella* (*second revision*)
5887 (Part 5) : 1976	Methods for detection of bacteria responsible for food poisoning: Part 5 Isolation, identification and enumeration of *Vibrio cholerae* and *Vibrio parahaemolyticus* (*first revision*)
6542 : 1972	Code for hygienic conditions for fruit and vegetable canning units
12014 (Part 1) : 1986	Methods for determination of organic preservatives in foodstuffs: Part 1 Benzoic acid and its salts
13815 : 2010	Fruit and vegetable products — Determination of soluble solids content — Refractometric method (*first revision*)
13816 : 2009	Fruit and vegetable products — Determination of mineral impurities content (*first revision*)
14397 : 1996	Methods for detection, isolation and identification of pathogenic *E. coli* in foods
14988 (Part 1) : 2001	Microbiology of food and feeding stuffs — Horizontal method for detection and enumeration of *Listeria monocytogenes*: Part 1 Detection method
ISO 15213 : 2003	Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of sulfite-reducing bacteria growing under anaerobic conditions
ISO 22855 : 2008	Fruit and vegetable products — Determination of benzoic acid and sorbic acid concentrations — High performance liquid chromatography method

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Tomato Puree — Tomato puree means unfermented product which is capable of fermentation, obtained by concentrating the juice of sound ripe tomatoes to the desired concentration. It shall contain minimum 9 percent by mass of total tomato soluble solids exclusive of salt. It may contain salt and other ingredients suitable to the product.

3.2 Head Space — The distance between the top of the double seam and the level of the surface of the contents in the container.

3.3 Defects — Presence of seeds, skins, stems, core and other coarse and hard substances.

3.4 Water Capacity — The water capacity of the container is the volume of distilled water at 20°C which the sealed container will hold when completely filled.

4 REQUIREMENTS

4.1 General

Tomato puree shall be obtained by concentrating the juice of sound, fresh and fully ripe tomatoes. It shall have/be:

a) characteristic red colour;

b) good flavour, characteristic of properly processed product. Product shall be free from foreign taste, in particular the taste of burned or caramalised products;

c) free from extraneous plant material including skin, seeds, and other coarse parts of tomatoes; and

d) practically free from mineral compounds.

4.1.1 The mineral impurities content when determined by the method prescribed in IS 13816 shall not exceed 0.1 percent of the dry mass content (*see* IS 5781) reduced by added common salt.

4.2 Ingredients

4.2.1 The tomato puree shall be free from added colours and artificial flavours.

4.2.2 It may contain added common salt (*see* Annex A), citric acid, natural spices, aromatic herbs and their extracts and natural aromas.

4.2.3 Benzoates and sulphites may be used as additive. The limits shall not exceed 1000 mg/kg for benzoates when tested by the method prescribed in IS 12014 (Part 1) or ISO 22855 and 100 mg/kg for sulphites when tested by the method prescribed in as per ISO 5522.

4.3 Other Requirements

4.3.1 Tomato puree shall also conform to the requirements prescribed in Table 1.

4.3.2 Tomato puree shall not contain metallic contaminants in excess of quantities specified in Table 2.

Table 1 Requirements for Tomato Puree

(*Clause* 4.3.1, 7 and C-4.1)

Sl No.	Characteristic	Requirement	Method of Test, Ref to IS or Annex
(1)	(2)	(3)	(4)
(i)	Pressure in the can (for canned product)	Negative	**5** of IS 2860
(ii)	Head space of the can in mm, *Max* (for canned product)	7	**6** of IS 2860
(iii)	Total tomato soluble solids exclusive of salt, percent by mass, *Min* (*see* NOTE)	9	13815
(iv)	Sugar content (expressed as invert sugar), percent by mass of the dry mass content reduced by added common salt, *Max*	42	Annex C

NOTE — The total soluble solids content is determined after the chloride content has been determined and added salt deducted. For every 1 percent chloride, 1.13 degree Brix or 0.0157 Refractive Index (at 20°C) must be subtracted. These corrections take account of the per-existing natural salt content which is considered equal to 2 percent.

Table 2 Limits for Metallic Contaminants in Tomato Puree

(*Clause* 4.3.2 and 7)

Sl No.	Characteristic	Requirement	Method of Test, Ref to Clause No. of IS 2860
(1)	(2)	(3)	(4)
(i)	Arsenic (as As), mg/kg, *Max*	0.2	13
(ii)	Lead (as Pb), mg/kg, *Max*	2.5	14
(iii)	Copper (as Cu), mg/kg, *Max*	100 on the dried tomato solid	15
(iv)	Zinc (as Zn), mg/kg, *Max*	5.0	16
(v)	Tin (as Sn), mg/kg, *Max*	250	17

4.3.3 The ***p***H shall not exceed 4.5.

4.3.4 *Minimum Fill*

Containers shall be filled as commercially practicable. However, the product shall occupy not less than 90 percent of the water capacity of the container when tested in accordance with the method prescribed in Annex B.

4.3.4.1 When the product is packed in glass containers, the water capacity shall be reduced by 20 ml.

4.3.5 *Microbiological Requirements*

The product shall conform to the microbiological requirements prescribed in Table 3.

4.4 Hygienic Requirements

The material shall be prepared and handled under strict hygienic conditions which have been laid down in IS 6542.

4.5 Additional Requirements for ECO-Mark

4.5.1 *General Requirements*

4.5.1.1 The product shall conform to the requirements prescribed under **4.1** to **4.3.**

4.5.1.2 The manufacturers shall produce to BIS environmental consent clearance from the concerned State Pollution Control Board as per the norms laid down under the *Water (Prevention and Control of Pollution) Act*, 1974; *Air (Prevention and Control of Pollution) Act*, 1981; *Water (Prevention and Control of Pollution) Cess Act*, 1977 respectively, along with the authorization, if required, under the *Environment (Protection) Act*, 1986, while applying for ECO-Mark.

4.5.1.3 The product/packaging may also display in brief the criteria based on which the product has been labeled environment friendly.

4.5.1.4 The material used for product/packing shall be recyclable or biodegradable.

4.5.1.5 The date of manufacture and date of expiry shall be declared on the product/package by the manufacturer.

4.5.1.6 The product shall be microbiologically safe and shall be free from bacterial and fungal toxins.

4.5.1.7 The product/package or leaflet accompanying it may display instructions of proper use, storage and transport (including refrigeration temperature compliance) so as to maximize the product performance, safety and minimize wastage.

5 PACKING AND MARKING

5.1 Packing

The product shall be packed in new cans, jars, canisters, bottles and it shall be securely sealed. It can also be packed in aseptic and flexible packaging material having food grade quality conforming to the standards laid down by BIS.

5.2 Marking

5.2.1 Each pack shall be marked or labelled with the following particulars:

a) Name and grade of the material with the brand name, if any;
b) Name and address of the manufacturer;
c) Net contents, in grams;
d) Month and year of manufacture;
e) Batch of code number, if any;

Table 3 Microbiological Requirements for Tomato Puree

(*Clause* 4.3.5 and 7)

Sl No.	Characteristic	Requirement				Method of Test, Ref to IS or Clause No.
		Sampling Plan [1]		Limit (cfu)		
		n	c	m	M	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(i)	*Salmonella*	5	0	Absent/25g	NA	5887 (Part 3)
(ii)	*Listeria monocytogenes*	5	0	Absent/25g	NA	14988 (Part 1)
(iii)	Sulphite Reducing Clostridia (SRC)	5	0	Absent/25g	NA	ISO 15213
(iv)	*E. Coli* 0157 and Vero or Shiga toxin producing *E. coli*	5	0	Absent/25g	NA	14397
(v)	*Vibrio cholerae*	5	0	Absent/25g	NA	5887 (Part 5)

Note: 1) For sampling plan see Annex D.

f) Manufacturing licence number;

g) List of ingredients, in descending order;

h) List of additives, if used;

j) The words 'Best before (Month and year to be indicated); and

k) Any other requirement as stipulated under *Food Safety and Standards Act*, 2006 and Regulations framed thereunder and *Legal Metrology Act*, 2009 and rules framed thereunder.

5.2.2 BIS Certification Marking

The product may also be marked with the Standard Mark.

5.2.2.1 The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

5.2.3 *ECO-Mark*

The product may also be marked with the ECO-Mark, the details of which may be obtained from the Bureau of Indian Standards.

6 SAMPLING

The method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in of IS 2860.

7 TESTS

Tests shall be carried out as prescribed in relevant clauses specified Table 1, Table 2 and Table 3.

ANNEX A

(*Clause* 4.2.2)

DETERMINATION OF SODIUM CHLORIDE

A-0 PRINCIPLE

A test sample of the product is diluted. An excess of titrated silver nitrate solution is then added. The excess is then standardized with titrated solution of potassium thiocyanate in the presence of ferric ammonia alum.

A-1 REAGENTS

A-1.1 Standard Silver Nitrate Solution — 0.1 N.

A-1.2 Pure Nitric Acid

A-1.3 Standard Solution of Ferric Ammonium Sulphate [$NH_4Fe(SO_4)_2 12H_2O$]

A-1.4 Standard Potassium Thiocyanate Solution — 0.1 N.

A-2 APPARATUS

A-2.1 Analytical Balance

A-2.2 Conical Flask — Of 200 ml capacity.

A-2.3 Graduated Pipette — Of 10 ml and 20 ml capacity.

A-2.4 Burette — Of 25 ml capacity.

A-3 PREPARATION OF SAMPLE

A-3.1 Transfer product to a 200 ml volumetric flask, using distilled water which has been recently boiled and cooled.

A-3.2 Rinse the weighing vessel with distilled water and transfer the rinse water to the volumetric flask. Make up to the mark with distilled water.

A-3.3 Shake well and filter the solution using a pleated filter.

A-3.4 Transfer 20 ml of the filtrate to a 250 ml conical flask and dilute with 40 to 50 ml of distilled water.

A-4 PROCEDURE

A-4.1 Add about 2 ml of nitric acid solution (**A-1.2**) and 10 ml (measured with graduated pipette) of standard silver nitrate solution (**A-1.1**). Boil for five minutes, and then cool.

A-4.2 Titrate using potassium thiocyanate solution (**A-1.4**) until the liquid turns a persistent pink colour, after adding a few drops of ferric ammonium sulphate solution (**A-1.3**). An initial determination is made using distilled water (white).

A-5 CALCULATIONS

A-5.1 The difference between the used volumes of nitric acid and potassium thiocyanate represents the volume of silver nitrate solution used to precipitate the chloride present in the test sample, reduction made for white. 1 ml of silver nitrate solution 0.1 N corresponds to 0.005 85 g of sodium chloride. Express the results in grams of sodium chloride per 100 g of the product.

A-5.2 The natural content of chlorides is fixed arbitrarily as 2 percent of the dry mass content.

Added chlorides = $Cl_r - Cl_{nat}$

$$\text{Natural chloride content } (Cl_{nat}) = \frac{2(NTS - Cl_r)}{100}$$

where,

NTS = dry mass content, and

Cl_r = total chloride.

ANNEX B

(*Clause* 4.3.4)

DETERMINATION OF WATER CAPACITY

B-1 GENERAL

This method applies to metal, glass and rigid plastic containers.

B-2 PROCEDURE

B-2.1 Metal Containers

B-2.1.1 Select a container which is undamaged in all respects.

B-2.1.2 Wash, dry and weigh the empty container after cutting out the lid without removing or altering the height of the double seam.

B-2.1.3 Fill the container with distilled water at 20°C to 4.8 mm vertical distance below the top level of the container, and weigh the container thus filled.

B-2.2 Glass Containers

B-2.2.1 Select a container which is undamaged in all respects.

B-2.2.2 Wash, dry and weigh the empty container.

B-2.2.3 Fill the container with distilled water at 20°C to the level of the top thereof, and weigh the container thus filled.

B-3 CALCULATION AND EXPRESSION OF RESULTS

B-3.1 Metal Containers

Substract the mass found in **B-2.1.2** from the mass found in **B-2.1.3**. The difference shall be considered to be the mass of water required to fill the container. Results are expressed as ml of water (V_0).

B-3.2 Glass Containers

Substract the mass found in **B-2.2.2** from the mass found in **B-2.2.3**. The difference shall be considered to be the mass of water required to fill the container. Results are expressed as ml of water (V_0).

B-4 CALCULATION OF PERCENTAGE FILL

To determine the percentage fill in the container, empty the entire contents of the container in a graduated volumetric cylinder and note down the volume (V_1). The formula for the calculation is as follows:

$$\text{Percentage fill} = \frac{V_1}{V_0} \times 100$$

where,

V_0 = Water capacity of the container, or

V_1 = Volume of contents filled in the container.

ANNEX C

[*Table* 1, *Item* (iv)]

DETERMINATION OF SUGAR CONTENT

C-0 GENERAL

Usually between 40 and 60 percent of the dry mass content in tomato based products consists of reducing sugar, mostly glucose and fructose in roughly equal proportions. The natural sucrose content of tomatoes is negligible. The natural sugar content is determined by the Lane and Eynon method without inversion.

C-1 REAGENTS

C-1.1 Copper Sulphate Solution (Fehling's Solution A)

Dissolve in distilled water 34.639 g of copper sulphate ($CuSO_4$ $5H_6O$), dilute to 500 ml and filter through glass wool or filter paper.

C-1.2 Alkaline Solution of Potassium Sodium Tartrate (Fehling's Solution B)

Dissolve 173 g of potassium sodium tartrate ($KNaC_4H_4O_6$ $4H_2O$) (Rochelle salt) with 50 g of NaOH in water and dilute to 500 ml. Leave standing for two days, then filter through asbestos.

C-1.3 Lead Acetate, Saturated Solution

C-1.4 Carrez Solution I — 15 percent aqueous solution of potassium ferrocyanide.

C-1.5 Carrez Solution II — 30 percent aqueous solution of zinc acetate.

C-1.6 Methylene Blue — 1 percent aqueous solution.

C-1.7 Sodium Sulphate or Sodium Oxalate — Saturated solution.

C-1.8 Phenolphthalein — 1 percent solution in alcohol.

C-1.9 Sodium Hydroxide — 0.1 N.

C-2 APPARATUS

C-2.1 Analytical Balance

C-2.2 Filter Paper — For rapid filtration.

C-2.3 Burette — Of 100 ml capacity.

C-2.4 Erlenmeyer Conical Flask — Of 250 ml capacity.

C-2.5 Pipette — Of 10-ml capacity.

C-2.6 Volumetric Flask — Of 250 ml capacity.

C-2.7 Round Bottom Flask — Of 200 ml capacity.

C-3 PROCEDURE

For the determination of sugar in tomato-based products, the quantity of the sample analyzed must be such that, after clarification and dilution, the sugar solution analyzed must contain a quantity of sugar such that 10 ml of Fehling's solution is completely reduced by 25 to 50 ml of sugar solution. The sugar solution must therefore contain between 105 and 205 mg of invert sugar per 100 ml of solution, as shown in Table 4.

During determination, the measured sugar solution is diluted so that 32 ml are required to reduce 10 ml of Fehling's solution; this concentration falls in the middle of the range given in Table 4. The sugar solution thus contains roughly 160 mg of invert sugar per 100 ml of solution.

C-3.1 Weigh out a quantity of the product corresponding to approximately 150/R g where R is the natural total soluble solids content.

C-3.2 Transfer the test sample to a 200 ml round-bottom flask. Rinse the test sample container and transfer the rinse water to the flask; then make up to the mark using distilled water.

C-3.3 Remove 100 ml of this solution using a pipette and transfer to a 250 ml volumetric flask.

C-3.4 Using a pipette, add 4 to 5 ml of saturated lead acetate solution; continue to add this solution carefully, two drops at a time.

C-3.5 Clarification should, however, preferably be obtained by adding 5 ml of Carrez solution I and 5 ml of Carrez solution II.

C-3.6 After clarification, allow the liquid to stand for 15 min. Then add a quantity of the saturated solution of sodium sulphate or sodium oxalate in order to remove any excess lead acetate. If there is any excess lead acetate, the addition of sodium sulphate or oxalate solution will produce a white precipitate.

C-3.7 Allow to stand for 15 min, then make up to the 250 ml mark with distilled water. Shake well, then filter using folded filter paper. Transfer some of the clear filtrate to a 100 ml burette; this solution is now ready for analysis.

C-3.8 Two determination of the sugar content must be carried out.

C-3.8.1 *Test Determination*

Transfer 10 ml of a mixture of equal parts of Fehling's A and B solutions into a 250 ml Erlenmeyer flask placed on a wire mesh. (Equal quantities of Fehling's solution A and B should be mixed together a few minutes before the determination.) Using the burette, add about 25 ml of the sugar solution. Boil for 15 s.

C-3.8.2 *Final Determination*

Place 10 ml of a mixture of equal parts of the Fehling's solutions in a 250 ml Erlenmeyer flask, then add directly the quantity of sugar solution which was used up during the test titration, less 0.5 ml. Bring the mixture to boil and simmer for exactly two minutes. Add one or two drops of methylene blue, then add the remaining sugar solution, two or three drops at a time, at 10 s intervals for about one minute, until the blue colour of the indicator turns reddish brown.

Let A be the quantity of sugar solution used up, expressed in 0.1 ml.

NOTE — As this is an empirical method, all the instructions given above must be followed rigorously.

C-4 CALCULATIONS

C-4.1 Refer to Table 4 to calculate from the number of ml of sugar solution used up (A), the invert sugar content of the sugar solution (C) and of the quantity of the product contained in the test sample. The formula for the calculation is as follows:

$$\text{Invert sugar in g per 100 g of product} = \frac{C \times 0.5}{\text{mass of sample}}$$

Where,

C = Column 3 of Table 1, corresponds to the volume A of sugar solution used up (column 1 of the Table)

C-4.2 If the invert sugar content (expressed as percentage by mass of tomato-based product is divided by the total soluble solids content, the result is the invert sugar content per 100 g of soluble solids.

Table 4 Invert Sugar Factor for 10 ml of Fehling's Solution

(*Clause* C-3 *and* C-4.1)

Milliliters of Sugar Solution Used up	Invert Sugar Factor	Milligrams of Invert Sugar in 100 Milliliters of Solution
A	*B*	*C*
25.0	51.2	204.8
2		203.4
4		201.9
6		200.4
8		198.9
26.0	51.3	197.4
2		196.0
4		194.6
6		193.2
8		191.8
27.0	51.4	190.4
2		189.1
4		187.7
6		186.4
8		185.0
28.0	51.4	183.7
2		182.5
4		181.2
6		180.0
8		178.7

Table 4 (*Continued*)

Milliliters of Sugar Solution Used up	Invert Sugar Factor	Milligrams of Invert Sugar in 100 Milliliters of Solution
29.0	51.5	177.5
2		176.3
4		175.2
6		174.0
8		172.9
30.0	51.5	171.7
2		170.6
4		169.5
6		168.5
8		167.4
31.0	51.6	166.3
2		165.3
4		164.3
6		163.2
8		162.2
32.0	51.6	161.2
2		160.3
4		159.4
6		158.4
8		157.5
33.0	51.7	156.6
2		155.7
4		154.8
6		154.0
8		153.1
34.0	51.7	152.2
2		151.3
4		150.5
6		149.6
8		148.8
35.0	51.8	147.9
2		147.1
4		146.3
6		145.5
8		144.7
36.0	51.8	143.9
2		143.2
4		142.4
6		141.7
8		140.9

Table 4 (*Continued*)

Milliliters of Sugar Solution Used up	Invert Sugar Factor	Milligrams of Invert Sugar in 100 Milliliters of Solution
37.0	51.9	140.2
2		139.5
4		138.8
6		138.0
8		137.3
38.0	51.9	136.6
2		135.9
4		135.3
6		134.6
8		134.0
39.0	52.0	133.3
2		132.7
4		132.0
6		131.4
8		130.7
40.0	52.0	130.1
2		129.5
4		128.9
6		128.3
8		127.7
41.0	52.1	127.1
2		126.5
4		125.9
6		125.4
8		124.8
42.0	52.1	124.2
2		123.6
4		123.1
6		122.5
8		122.0
43.0	52.2	121.4
2		120.9
4		120.3
6		119.8
8		119.2
44.0	52.2	118.7
2		118.2
4		117.7
6		117.1

Table 4 (*Concluded*)

Milliliters of Sugar Solution Used up	Invert Sugar Factor	Milligrams of Invert Sugar in 100 Milliliters of Solution
8		116.6
45.0	52.3	116.1
2		115.6
4		115.1
6		114.7
8		114.2
46.0	52.3	113.7
2		113.2
4		112.8
6		112.3
8		111.9
47.0	52.4	111.4
2		111.0
4		110.5
6		110.5
8		109.6
48.0	52.4	109.2
2		108.8
4		108.4
6		107.9
8		107.5
49.0	52.5	107.1
2		106.7
4		106.3
6		105.9
8		105.5
50.0	52.5	105.1
2		
4		

ANNEX D

[*Table* 3]

SAMPLING PLAN FOR MICROBIOLOGICAL REQUIREMENTS

D-1 SAMPLING PLAN FOR MICROBIOLOGICAL REQUIREMENTS

The terms n, c, m and M used in this standard have the following meaning:

n = Number of units comprising a sample;

c = Maximum allowable number of units having microbiological counts above m for 2-class sampling plan and between m and M for 3-class sampling plan;

m = Microbiological limit that separates unsatisfactory from satisfactory in a 2-class sampling plan or acceptable from satisfactory in a 3-class sampling plan; and

M = Microbiological limit that separates unsatisfactory from satisfactory in a 3-class sampling plan.

D-2 INTERPRETATION OF RESULTS

2-Class Sampling Plan (where n, c and m are specified)	3-Class Sampling Plan (where n, c, m and M are specified)
1. Satisfactory, if all the values observed are ≤ m	1. Satisfactory, if all the values observed are ≤ m
2. Unsatisfactory, if one or more of the values observed are > m or more than c values are > m	2. Acceptable, if a maximum of c values are between m and M and the rest of the values are observed as ≤ m
	3. Unsatisfactory, if one or more of the values observed are > M or more than c values are > m

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

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Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi, KOLKATA 700054	2337 8499, 2337 8561, 2337 8626, 2337 9120
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